# Evolution of Combustion Technology to Support National Energy Needs

**Workshop Perspectives, Goals, Desired Outcome**

**By**

**Carl Bauer, Associate Director**

**National Energy Technology Laboratory**

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# You Are The Key

**Your Participation in this Workshop will help NETL develop a combustion program to meet this goal over the long term, creating the next 50 years of America's progress**

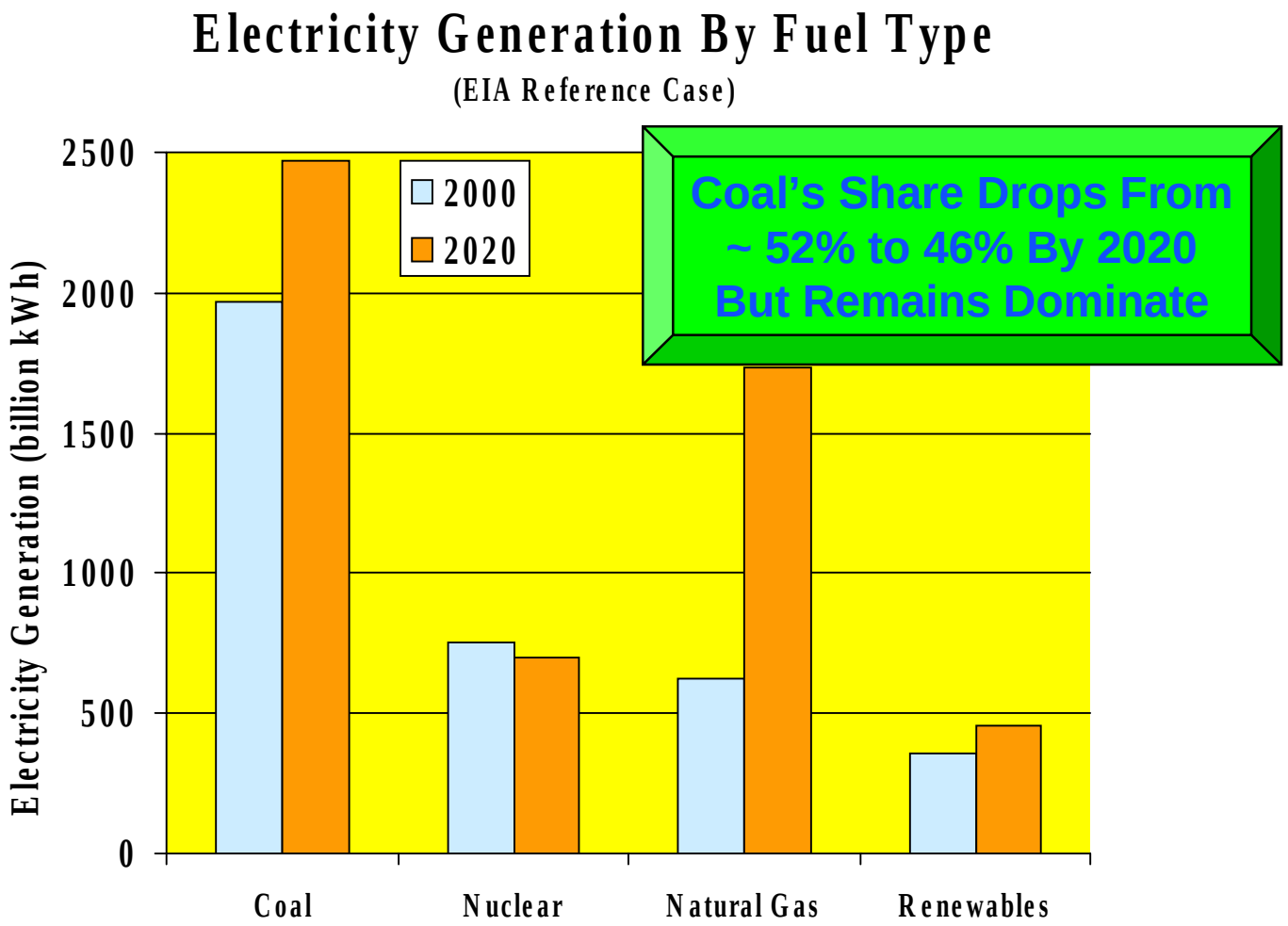
# Evolution of Combustion Technology - Today

Photo courtesy of Carolina Power & Light Co.

# National Energy Needs and Strategy

- *"The goals of this strategy are clear: to ensure a steady supply of affordable energy' for America's homes and business and industries."* **-** *President, George W. Bush*
- **Energy Security**
  - Reliable Domestic energy supplies
- **Affordable Energy**
  - Reduce price volatility and supply uncertainties
  - Promote Modernization and Expansion of Power Generation Infrastructure via; Energy Efficiency, Co-Generation, and Renewable Co-Firing
- **Environmentally Sound Energy**
  - Develop and establish flexible, market based technology to reduce SOx, NOx, and Hg on a multi-pollutant basis
  - Increase export of America's "Clean Coal Technologies" for world wide emission reductions and efficiency improvement

# Coal To Remain Key Electricity Source




*Source: Data Derived From EIA Annual Energy Outlook 2002*

# Why Combustion?

- Over three quarters of all the electricity in the US is produced by Combustion (Coal, Gas, Oil and Bio-mass) based power plants.
- Over half of the electricity is produced by solid fuel (coal-fired) Combustion power plants.
- Combustion has been and remains the cheapest, most direct way to produce electricity.
- Improvement, Expansion and Repowering of the current Combustion power plant fleet are opportunities for today's and tomorrow's power generators.

# Retrofit & Repowering Potential for Coal?

## *Substantial !!!*

**Coal Nameplate Capacity**

**321 GW**

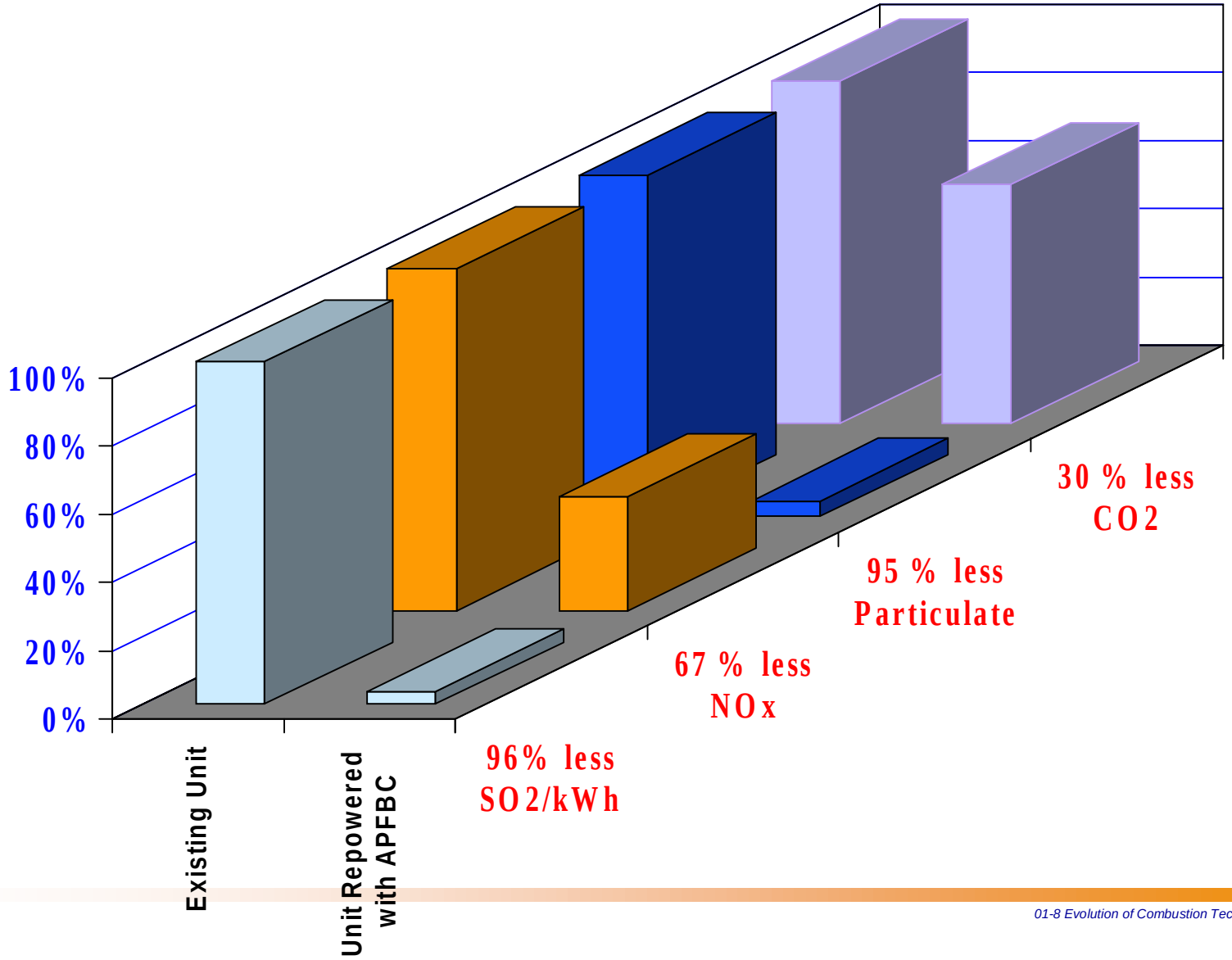
**44% of Total**

**240 GW (75%) of Fleet Capacity Is Prime Target For Increased Capacity Retrofit (40 GW potential in 3 years!)**

**80 GW (25%) of Fleet Capacity Is Prime Target For Repowering With Cleaner, Higher Efficiency Coal Technologies**

*Sources: National Coal Council*

# Combustion Repowering
# Typical Environmental Improvement



# Improvement, Expansion and Repowering

- **Improvement - NETL combustion program needs your input to identify new areas for Advanced Combustion technology development.**
- **Expansion of Current power producing units is needed to meet project 393,000 MW needed in just the next 20 years.**
- **US needs to build 1,300 power plants over that twenty year period, or about double the number of plant currently operating.**
- **Repowering of an existing plant, increasing even doubling the output becomes every attractive.**

# DOE Has Invested in Other Concepts

- **How to use past work, how do we integrate it into competitive systems, should we?**
  - Pressurized Fluidized Bed Combustion (PFBC)
  - Hot Gas Filtration (world wide interest continues)
  - Pressurized suspension coal-fired components
  - Additional Low NOx  and Ultra Low NOx projects
  - Oxygen enhanced combustion
  - Advanced pressurized feed and let-down systems
  - Advanced controls
  - Hydraulic Compression
  - Syngas combustion- pressurized burners

# Workshop is to Expand upon NETL's Economic Coal-Fired Power Generation Interviews

- **Three primary Factors cited as key in building new generation**
  - ***Capital Cost***
  - ***Risks (market dictates minimum)***
  - ***Flexibility (feedstock, operation, siting)***
- **Opportunities to Reduce Cost**
  - ***Increase performance and reliability via system Integration and reliability via plant optimization***
  - ***Reduce construction schedule and cost***
  - ***Develop "Smart" plant concepts***
  - ***Revise "policies" to allow standardization of products***

# Combustion Systems and Concerns to be Covered by Workshop

- Pulverized Coal
- Cyclones
- Arch-fired Units
- CHIPPS
- LEBS
- FBC
- CFBC
- PFBC
- Hybrids
- Coal Fired Peakers
- Balance of Plant
- Coal Preparation
- Other Slagging Combustors
- Hot Gas Clean-Up
- Advanced Steam Turbines
- Advanced Controls
- Advanced Materials
- Risk

# What Does DOE Want

- **Recommendations for DOE Combustion Priorities**
  - What are the new  concepts that are clean, flexible, low cost and highly
  - What RD&D should we pursue to support future CCPI activities and project in Combustion
  - Which RD&D is supportable by Private Sector
  - How can we enable dialogue--with the combustion field, improve public relation, and educate
  - Support new technology demonstration by reduce the risk barrier

# Evolution of Combustion Technology - Tomorrow